U. S. FOREST SERVICE

RESEARCH NOTE LS-16

LAKE STATES FOREST EXPERIMENT STATION • U. S. DEPARTMENT OF AGRICULTURE

Porcupine Winter Feeding Activity in Merchantable Stands of Northern Hardwood—Hemlock

Porcupine sometimes cause considerable damage to both hardwood and conifer species in Lake States forests. But little is known of the population levels that result in appreciable damage or of the animal's behavior patterns. Although recent injury can be readily tallied from the ground, assessment of past animal activity on the standing tree is difficult. A complete picture for a period of years can be obtained only by examining the tree crowns after a cutting operation.

In the fall of 1961, a study of porcupine activity in northern hardwoods was conducted by the University of Michigan in cooperation with the Station. Tree tops from a commercial lumbering operation near Golden Lake on the Ottawa National Forest in northern Michigan were examined. A sample of 288 tops was chosen objectively, and current and past porcupine damage was recorded as to year of feeding, feeding intensity, and location on the tree. The sample was biased in that selective marking favored the removal of trees of poor form and low value. Yellow birch, basswood, and sugar maple were favored for retention, while proportionately more hemlock and elm were removed. Since hemlock is a preferred winter food and elm is also favored by the porcupine, the sample probably included more trees likely to have suffered from feeding than those uncut.

The size of the trees cut ranged from 5 to 35 inches d.b.h., although most were between 14 and 24 inches d.b.h. Within this range, neither tree height nor d.b.h. had a significant effect on porcupine activity.

Kind and location of trees used by the porcupines were also studied as related to other habitat components such as the presence of den trees and stand composition.

Fifty-eight percent of the trees examined had been gnawed on sometime during the past 20 years (table 1). Of the total sample, 30 percent (50 percent of those gnawed) showed a high degree of activity, defined as girdling or stripping of large patches of bark (fig. 1). Eleven percent of the trees had been gnawed within the previous 2 years and 5

TABLE 1. — *Porcupine activity by tree species at Golden Lake, Mich.*

Species	Number of tops in sample	Percent gnawed within each species	Species preference—expressed as a ratio[1]
Sugar maple	170	51.8	.89
Yellow birch	55	50.9	.87
Hemlock	32	90.6	1.55
Elm	17	94.1	1.61
Basswood	8	75.0	1.29
Red maple	2	50.0	.86
Ironwood	2	0	0.0
Black cherry	1	0	0.0
White spruce	1	0	0.0
Total	288	58.3	

[1] *This ratio is the percent of trees gnawed within a species divided by the percent of all trees gnawed.*

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FIGURE 1. — This 6-inch sugar maple shows partial or complete girdling by porcupines each year for 3 years.

percent within the previous year. A census of the quarter section under study showed that 9 to 12 animals were present and probably had been present during the previous winter. The data suggest that, in any given year, a population of 40 to 50 animals per square mile would affect in some way about 5 percent of the trees represented in a selectively marked commercial cutting.

Five percent is a maximum value for the entire stand, as indicated by the bias in marking toward trees previously damaged and most susceptible. Trees left standing would show a somewhat lower incidence of feeding damage.

Certain trees showed a disproportionate amount of activity. Apparently, after an animal discovers a suitable tree, he returns to it year after year and may be joined by other animals.

Activity was concentrated in relatively limited portions of the area, primarily in the vicinity of hemlock. Elm and hemlock show almost twice as much use in relation to availability of stems as do sugar maple and yellow birch; basswood is intermediate in use. Damage to elm is light since feeding is normally restricted to small twigs, while the bark is stripped on other species.

Current silvicultural practices discriminate against hemlock. This, combined with regeneration failures and deer browsing, is causing the gradual disappearance of hemlock from many stands. The change in composition may lower the carrying capacity for porcupine. Whether the final result will be a drop in the population or (more likely) less concentrated feeding activity and increased use of valuable timber species by porcupine is still in doubt. The presence of den sites is also an important factor in maintenance of porcupine populations.

Study of a hardwood logging operation near Ada Lake in Wisconsin revealed somewhat greater porcupine activity than at Golden Lake. Again, 58 percent of the total trees cut had been gnawed, but feeding activity was more intense; during the previous 2 years, it was almost four times as great (44 percent) as it had been at Golden Lake. Kills during control hunts indicated a porcupine population in the Ada Lake stand of approximately 50 to 75 animals per square mile, a considerably higher population than at Golden Lake. Thus, feeding damage appears readily related to population size.

Based on percentage of trees gnawed, degree of injury, and currentness of feeding, the activity in the Ada Lake stand was 27 percent greater than that at Golden Lake. This compares favorably with the difference (25 percent) in estimated animal populations.

Results of this study suggest that knowledge of the currentness and intensity of feeding and percentage of the trees gnawed in a stand may provide a means of estimating porcupine populations in the northern hardwood forest type. Population and behavior data will help forest managers to make intelligent decisions on the need for and the type of porcupine control measures to be exercised.

ROBERT BRANDER, Biologist
University of Michigan
FOREST W. STEARNS, Research Forester
(General)
Lake States Forest Experiment Station